iron with dilute sulphuric acid, and he proves that it is not a supporter of life.

Mayow's second treatise is on respiration, and he herein expresses views far in advance of any of his predecessors. He proved that the nitre-air is alone concerned in respiration, and he asserts that this is absorbed by the blood, while the rest is rejected. It unites with combustible particles in the lungs, and thus produces animal heat. The lungs consist of a number of minute sack shaped membranes through which the nitre-air passes to the blood.

We add the following *résumé* of Mayow's treatise, and of the position which it ought to occupy in the history of chemistry, from an article which we wrote on the subject a few years ago.

Mayow's work is remarkable in several respects. In it he conclusively proved that respiration and combustion are analogous processes; he upset the four-element theory by demonstrating the compound nature of air; and he recognised oxygen and nitrogen as clearly and almost as notably as they were recognised a hundred years later—the one the supporter of life and combustion, the principle of acidity, and the cause of fermentation and putrefaction, heavier than atmospheric air; the other incapable of supporting life or combustion, and lighter than atmospheric air. We find, moreover, in this work the dawn of the idea of chemical affinity in the *fermentation*, which he speaks of as taking place between nitre-air and combustible particles, and extending to the production or destruction of things. Mayow even employs some of the terms in general use in the present day; thus he speaks of *affinitas*, existing between acids, and earthy substances, and uses the words *combinetur* and *combinentur* in speaking of the *congressus* of different substances.

The treatise is characterised by much clear and condensed thought, well-sustained argument, and accurate reasoning; moreover, we seldom meet with instances of too hasty generalisation, always the dominant source of error in the early development of a science. We further observe a great advance towards that exact and discriminative mode of thought which is necessary for the investigation of chemical phenomena. The period in which Mayow wrote, was, as regards chemistry, a period of transition; there was as yet no work on scientific chemistry, yet Mayow's treatise approached more nearly to such a work than that of any of his predecessors. The works of previous writers in this direction belonged to one of the three following classes: they were either chemico-metallurgic, chemico-medical, or alchemical treatises, or they partook of the nature of all three. The publication of works on alchemy was fast waning before the advances of the new philosophy; for as superstition retreated, and as men began to devote their energies to the legitimate investigation of nature, a false and chimerical art must of necessity cease to find votaries. Mayow was the first to discuss the intimate nature of an intangible body; other writers had treated of the air as a whole, but no one had endeavoured to ascertain the nature of its internal constitution, or to determine why it produces certain changes in surrounding bodies, upon what these changes depend, and the nature of the constituent or constituents of the air producing them. The old dogma of the elemental nature of the air was received as an absolute truth, although entirely unproven; it was thought that a theory which had been received since the earliest ages must of necessity be correct, and no attempt was made to disprove it.

We see from the above that it was the investigation of the nature of nitre which led to the knowledge of the constitution of the air, and to the first experiments in pneumatic chemistry. Mayow remarks at the commencement of his treatise, that so much had been written about nitre, that it would appear "*ut sal hoc admirabile non minus in philosophia, quam bello strepitus ederet; omniaque sonitu suo impleret;*" and when he remembers its connection with the foregoing results we are almost inclined to agree with him. G. F. RODWELL

SCIENTIFIC SERIALS

THE *Journal of Botany* for April commences with two useful papers on Cornish botany: Supplementary Contributions to the Flora of North Cornwall, a very little known district, by Mr. J. G. Baker, and another by Mr. T. Archer Briggs.—Mr. F. E. Kitchener contributes a very interesting note on Cross-fertilisation, as aided by sensitive motion, in Musk and Achimenes, the former from observations of his own, the latter from those of Miss Dowson. The structure and motion of the sexual organs, which have long been known in both these flowers, are clearly shown to be contrivances for ensuring cross-fertilisation by insect-agency.—Dr. M'Nab, in a short paper, suggests the employment of the term "pseudocarp," to distinguish fruit-like structures from true fruits, such, for instance, as the apple, the strawberry, the rose-hip, the mulberry, and the fig, into the composition of which other organs besides the true fruit enter. Among the short notes, the most interesting is one of the discovery of *Echium plantagineum* in Cornwall, by M. Ralfs, the plant having been hitherto confined, as far as British botany is concerned, to the Channel Islands. There is a coloured illustration of four new Hymenomycetous fungi, by Mr. W. G. Smith.

Poggendorff's Annalen, No. 1, 1873.—This number opens with the fourth of a series of papers, by Oscar Emil Meyer, on the internal friction of gases; he shows that Poiseuille's law for droppable fluids is verified for gaseous transpiration through narrow pipes.—Dr. Hermann Herwig communicates an account of experiments made on the action of the induction spark in explosion of gaseous mixtures; this action varying with pressure and concentration in the mixture, and with the quantity of electricity passed.—An apparatus of physiological interest, termed the Physometer, is described by P. Hartwig. It is a refinement on Robert Boyle's idea for examining the action of the swimming bladder in fish. The fish, enclosed in a wire cage, is elevated or depressed at will in a vessel filled with water, while the changes of volume in the animal are indicated by the rise and fall of water in a thin tube connected with the vessel.—Dr. Pfeffer, in a paper on the decomposition of carbonic acid in plants by the different spectral rays, infers from his experiments that the curve representing the decomposition mainly corresponds with the curve of brightness.—This paper is followed by another on a similar subject, by E. Gerland. Among the remaining articles may be noted those on the Synaphy (or cohesion) of ethers, by Dr. Scholz, on the polarisation and colour of light reflected in the atmosphere, by E. Hagenbach, and on the electromotive force of very thin gaseous layers on metallic plates, by F. Kohlrausch.

No. 2 contains one of a series of papers, by Julius Thomsen, entitled *Thermo-chemische Untersuchungen*. In the present number he investigates the affinity of hydrogen to the metalloids, chlorine, bromine, and iodine.—Oscar Meyer also continues his series on internal friction of gases; giving a detailed account of two kinds of apparatus for estimating the influence of temperature on friction, and adding some valuable observations on the dynamical theory of gases.—Several new apparatuses are described in this number, Prof. Mayer, of Hoboken, explaining a method of observing the phases and wave-lengths of sound-vibrations in air, and also his acoustic pyrometer based on this method; while an improved deep-sea thermometer, a new form of siphon, and a photometer based on the perception of relief, are described by their several inventors.—A second paper on the physometer is also communicated by P. Hartwig, in which the physiological and other applications of the instrument are more fully discussed.—W. Feddersen contributes an account of a phenomenon which he proposes to call *thermo-diffusion*, and which occurs when two portions of gas are separated by a porous diaphragm, the opposite sides of which have different temperatures. A diffusion is observed which, unlike the ordinary diffusion, takes place when, on both sides of the diaphragm, there is the same gas with the same pressure.—Dr. Morton communicates a note on fluorescence, supplementary to Hagenbach's researches; and there are, in addition, a few notes from English and other sources.

Revue des Sciences Naturelles, Nos. 1-3, 1872.—This new quarterly journal, published at Montpellier, is another proof of the scientific activity which is now reviving in France. Like Lacage Duthier's *Archives de Zoologie*, this provincial review will we trust exhibit what Prof. Jourdain calls in one of these numbers "ces qualités éminemment françaises: la méthode, la rigueur et la clarté," combined with *Deutscher Fleiss und Unbefangenheit*, which though of late years less common in France may well be reclaimed as no alien virtues by the countrymen of Descartes, and Cuvier, and Laennec. The editor is M. Dubrueil, with whom Dr. Heckel was associated in the first two numbers. Among the contributors are the names of Andouard, Barthélemy, Boyer, Paul Gervais, Joly, Jourdain, Robin, Malinowsky. The first number opens with a paper by Prof. Joly, on the development of the Axolotl, illustrated with some good drawings. There follows a short communication on a new French mollusk (*Pisidia Dubrueui*), an introductory lecture on botany, and an account of the geology of

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the neighbourhood of Montpellier. Perhaps the most important part of this and the subsequent numbers is a series of careful abstracts of French and foreign publications in zoology, botany and geology. The second number contains a botanical paper on certain Juncaceæ, by Duval-Jouve, with plates; a new classification of Mammalia, by Prof. Contejean (there is nothing very new in it: the chief novelties are definitely uniting the elephant with Rodentia, and separating the Pinnipedia from the other Carnivora to associate them with Sirenia and Cetacea); a description of diatoms found in the mixture of various corallines and algæ which is known in pharmacy as "Mousse de Corse" (*Corallina corsica*, "sea-moss"), by A. de Brébisson; and a short account with a plate of the remarkable Filaria discovered in chylous urine, by Wucherer and T. R. Lewis, and lately found in human blood by the latter observer. Among the abstracts of this number, by Prof. Jourdain, is an interesting review of the affinities of *Amphioxus* and the Tunicata from an anti-Kowelevskian point of view, by Prof. Jourdain, *àpropos* of Giard's *Etude* on the subject in the *Archives de Zoologie*. The third number, published last December, contains, among other articles, an important communication from M. Bavay on the development of a frog (*Hylodes Martinicensis*, Tschudi), observed in the island of Guadaloupe. Though it issues from the egg as a perfect anurous abranchiate Batrachian, it can be seen in the semi-transparent fœtal coverings to go through the tadpole stage, having a well-developed tail and small external gills, both of course functionless. We congratulate M. Dubreuil on his enterprise and success, and hope he will be able to maintain the high character of the first three numbers of his review. P. S.

SOCIETIES AND ACADEMIES

London

Chemical Society, April 17.—Dr. Odling, F.R.S., president, in the chair.—Dr. Debus, F.R.S., delivered a lecture "On the Heat produced by Chemical Action." The speaker considered the relation existing between the chemical affinity of the metals and the amount of heat they develop during oxidation or combination with chlorine, iodine, &c., and also the various interesting conclusions which may be drawn from the thermic results obtained by the solution of salts, especially noticing that, in double decomposition taking place in solution, those compounds are always produced which develop the greatest amount of heat.

Geologists' Association.—Excursion to Banbury, April 14 and 15.—This, the first excursion of the season, was under the direction of Prof. Morris and Mr. T. Beesley, and was largely attended. After their arrival at Banbury, the members and their friends examined exposures of the Middle Lias Clays (zone of *A. capricornus*) and the marlstone in the immediate vicinity of the town. Subsequently the party proceeded southwards, visiting at Twyford a section of the Lower Middle Lias, and at King's Sutton an extensive exposure of the marlstone which is here worked for ironstone. Fossils, especially Brachiopoda, are numerous at this place, and abundant occupation was found for the hammers of the party. At Newbottle Prof. Morris described the physical geology of the district, and showed how the hills and valleys, the agriculture, the occupations of the people, and even the houses and churches of a district, depended upon its geological structure. In the evening the members were entertained at a conversazione in the Town Hall, Banbury. A very fine collection of the local fossils as well as of antiquities and other objects of interest, had been brought together by the exertions of Mr. Beesley, and a large assembly testified to the interest the visit of the Association had occasioned. During the evening Prof. Morris delivered a lecture in which he described generally the geology of Banbury, and enlarged upon the advantages of a study of the science. The route for the second day was a long one, and the party left Banbury early, and proceeded by Constitution Hill section of Upper Lias, Broughton Castle and Church, Tadmarton quarries of great oolite, and Camp, Bloxham Church, Comb Hill quarry in inferior oolite, and Adderbury ironstone quarries in marlstone and upper lias. The physical and stratigraphical geology was explained at the various stopping places, and many fossils were obtained at some of the sections. At Tadmarton Mr. Beesley had provided luncheon for the members and visitors, who, while assembled in an ancient British camp, were addressed by Prof. Morris, Mr Beesley, and Mr. Lobley. The association has, during the present session, paid visits of inspection to the British Museum, the Museum of the Royal College of Surgeons, and the Museum of Practical Geology, and lectures descriptive of portions of the collections have been delivered by W. Carruthers, F.R.S., Prof. Morris, F.G.S., Prof. Flower, F.R.S., and R. Etheridge, F.R.S.

Dublin

Royal Irish Academy, April 14.—Dr. Stokes, F.R.S., vice-president, in the chair.—Professor R. Ball, LL.D., read some Notes on Applied Mechanics, and the secretary read, for Mr. Donovan, a description of a Comparable Self-registering Hygrometer.

Riga

Naturforscher Verein, Aug. 28, 1872.—Cand. Westermann described his visit to the Ilsingsee, in which is an island that periodically appears and disappears. It generally makes its appearance above water as the warm weather comes on, and the phenomenon is supposed to depend on the development in the peat at the bottom of marsh and coal gas, which is increased by the heat, and causes the masses of peat to float upwards towards the surface.

September 25.—Herr C. Berg gave a detailed report of Dr. Müller's work on the "Application of the Darwinian Theory to Flowers and Flower-frequenting Insects."

October 2.—Dr. Kersting exhibited some living young frogs, which had been from four to six weeks in the tadpole state. While some had already completed their development, others were still at various stages of transformation; one animal had all four legs, but still retained its long tail, while another was as yet only a biped. In proportion as the feet developed, the animal became all the more meagre, and at the same time the faster the tail disappeared.—Herr Thoms produced some pieces of the so-called sugar boxwood, an inferior kind of South American mahogany, in which a remarkable secretion of a white hard substance had been found. He found it of the following composition:—Ca O 33·24. PO_5 42·30. Organic matter 3·06. Water 21·40, which is expressed in the formula 2 Ca O + PO_5 + 4 HO. This is almost the same composition as that of the substance which gathers round the kidneys of the sturgeon.

October 16.—Prof. Kieseritzky gave a list of plants rarely met with in the province around Riga.—Dr. Bienert read a paper on the *Conifera*.

Vienna

Geological Institute, March 5.—Dr. R. v. Drasche showed a mineral that was found in the environs of Plaben, near Budweis, in South Bohemia. The specimens show a white nucleus which consists of felspar, and contains in almost equal proportions lime, potass, and soda. This nucleus is surrounded by a perfectly homogeneous, pellucid green mineral, which sometimes enters in small veins into the felspathic substance; the microscopic examination of this green mineral shows not only the polyhedric forms of the metamorphosed feldspar, but even the stripes characterising the feldspar-twins (*Zwillings-streifung*) are clearly visible. There can be no doubt therefore that the green mineral is a real pseudo-morphosis of feldspar; it belongs to the family of the chlorites and in its properties and chemical constitution is most similar to the pennine or to the pseudophite, described by Kenngott from Mount Idiar in Moravia.—T. Posepny on tube-ores (*Kohren Erze*) from Raibl in Corinthia. In the lead mines of Laibl there are to be found stalks, some lines in diameter and some inches in length, consisting in the outer part out of crystalline galena, whilst the axis is either quite hollow, or is filled with earthy matter. These tubes are inclosed in the dolomite which is the bearer of the lead ores of the country. M. Posepny thinks that these tubes are formed by the deposit of the galena on real stalactites.—M. Ch. v. Hauer on the occurrence of different sorts of coal in one and the same bed. By an accurate investigation of the brown coal of different localities in Styria, the author stated that it consists generally of two different sorts of coal which are mechanically mixed in the same bed, and sometimes in every single specimen. The one sort shows a rather slaty fracture, is faint, compact, and of less heating power; the other, on the contrary, has a conchoidal fracture, is shining, more easily friable, of greater heating power, and may be coked. In the same way in some layers of lignite v. Hauer found small parties of shining coal which resembles good brown coal; he is inclined to suppose that such differences of the coal in the same bed may

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